REMARKS

Office Interview

As an initial matter, applicant wishes to sincerely thank the Examiner for granting a personal interview to discuss the instant invention on June 14, 2007. A copy of the Examiner's Interview Summary is attached with this amendment for reference. In the June 14, interview, applicant presented a video demonstration of the lateral electrodeposit growth rate acceleration characteristic of directly electroplateable resins, materials which are within the scope of the instant invention. In addition, proposed claim language was discussed which defined structure not included in several prior art documents. Examiner also explained to applicant his rationale for prior claim rejections.

Claim Amendments

The instant amendment cancels pending claims 2 through 18 and adds new claims 19 through 44. New independent claims are 19, 41, and 44.

The paragraph numbering of Publication US 2004/0069340A1 differs from that of the application "as filed". Unless otherwise noted, paragraph references in the following refer to that of the application "as filed".

New claim 19 is substantially similar to that claim language discussed in the June 14, 2007 interview. However, the original language discussed employed the term "electrically conductive surface". This term has been replaced in the instant new claim 19 by "electrically conductive or semi-conductive surface". The reason for this change can be explained by reference to paragraph 036 of the instant specification as filed (Paragraph 0040 of Publication US 2004/0069340 A1). There it is stated that "While not precisely definable, …electrically conductive materials may generally be characterized as having electrical resistivities less than .001 ohm-cm. Also, electrically resistive or semi-conductive materials may generally be characterized as having electrical resistivities in the range of 0.001 ohm-cm to 10,000 ohm-cm.". Many of the surfaces suitable for making the combination of instant claims may be formed from materials having intrinsic resitivities in the semi-conductor range of this generalized definition. Thus, in order to eliminate any possible ambiguity, the surface is described as "electrically conductive or semi-conductive".

Support for claim 20 is found throughout the specification, and specifically in the teachings associated with Figures 50 through 81.

Support for claim 21 can be found in the teachings involving the embodiments of Figures 1 through 3 combined with the teachings associated with Figures 50 through 81.

Support for claim 22 can be found in the teachings involving the embodiments of Figures 1 thorough 3.

Support for claim 23 can be found in the teachings involving the embodiments of Figures 1 thorough 3.

Support for claim 24 can be found throughout the specification, in that many embodiments teach use of photovoltaic cells which by definition generate photogenerated current.

Support for claim 25 can be found throughout, and specifically at paragraphs 197 and 198 of the Specification as filed.

Support for claim 26 can be found at Paragraph 192 of the Specification as originally filed.

Support for claim 27 can be found at Paragraph 199 of the Specification as originally filed.

Support for claim 28 can be found at Paragraph 192 of the Specification as originally filed.

Support for claim 29 can be found at Paragraph 192 of the Specification as originally filed.

Support for claim 30 can be found at Paragraph 192 of the Specification as originally filed.

Support for the structure of claim 31 can be found in Paragraph 196 and Figures 56-58 of the Specification as originally filed.

Support for the "printed material" limitation of claim 32 can be found at Paragraph 23 (last sentence) and Paragraphs 198 and 199 of the Specification as filed. In regard to this "printed material" limitation, applicant notes the Examiner's position stated in the last paragraph of section 7 of the Office action mailed 4/17/07. There the Examiner stated that "undue weight cannot be given to this limitation to the formation of a product by a specified process". Applicant disagrees with this position when considering the limitation of "printed material". The process of printing intrinsically results in a structure, specifically a substantially two-dimensional form having a low profile. A "printed material" would be understood to have such structure. Therefore, applicant argues that "printed material" is intrinsically a structural limitation.

Claim 33 is supported at paragraphs 195 and 196 of the Specification as originally filed.

Claim 34 is supported at paragraph 195 of the Specification as originally filed.

Claim 35 is supported at paragraphs 032, 195, and 223 of the Specification as originally filed.

Claim 36 is supported at paragraph 195 of the Specification as originally filed.

Claim 37 is supported at paragraph 027 of the Specification as originally filed.

Claim 38 is supported in multiple places in the Specification as originally filed. Specifically, silver is identified at paragraph 014 as a typical conductive filler for production of electrically conductive polymers. At paragraph 213, electrodeposition is identified as a suitable method for depositing silver. Both electrically conductive polymeric inks and electrodeposited metals are identified as materials used in preferred embodiments of the instant invention. Copper is identified in paragraphs 025 and 213 as a typical electrodeposited metal. Electrodeposition of metals is used to prepare preferred embodiments of the instant invention. Nickel is identified in paragraphs 012 and 025 as a typical electrodeposited metal. Electrodeposition is identified as a preferred method to produce the structure of the instant invention.

Claim 39 is supported at paragraph 200 of the specification as filed. Regarding the "low melting point" limitation, the instant specification does not precisely state a temperature considered to be "low". Nevertheless, the specification does indeed state at paragraph 200 that "In this case the low melting point metal-based material is caused to melt during the process 177 of Fig. 60 thereby increasing the contact area between the mating surfaces 185 and 59." Thus the melting temperature of the "low melting point metal-based material" would be below the temperature reached during the lamination process of Figure 60. It is well known in the packaging industry that lamination of polymeric films is typically accomplished at temperatures less than 600 degree F. Thus it can be deduced by one of normal skill in the art that the melting point of the "low melting point metal-based material" is below 600 degree F. This is consistent with the melting temperatures of typical solders, materials commonly considered in the industry as "low melting point materials".

Claim 40 is supported at paragraph 200 of the Specification as originally filed.

Claim 41 is supported by the embodiments of Figures 62, 63, and 81 and the related discussion of these figures in the Specification as filed.

Claim 42 is supported by the embodiments of Figures 62, 63, and 81 and the related discussion of these figures in the Specification as filed.

Claim 43 is supported by the embodiments of Figures 53 through 63 and the related discussion of these figures in the Specification as filed.

Claim 44 is supported by paragraphs 21, 34, and 35, as well as the embodiments of Figures 53 through 63 and Figures 76 through 81 and the related discussion of these figures in the Specification as filed.

Comments On Cited References

In the Patent Office action of 4/17/07, the Examiner cited three references in rejecting all the claims pending at that time. The references were as follows.

-Little, (U.S. 4,380,112)

-Lupinski, (U.S. 3,764,280)

-Tsuzuki et al. (U.S. 5,679,176)

Little (U.S. 4,380,112): Little forms an electrode by embedding metal wires into a glass plate at high temperatures suitable for softening the glass. Regarding instant independent claim 19, Little does not teach or suggest a patterned polymeric material nor patterned electrodeposition of metal. Regarding instant independent claim 41, Little does not teach or suggest using a polymeric material having the ability to facilitate metal deposition. Regarding instant independent claim 44, Little does not teach or suggest a structure or material traces having two opposing surfaces, a first of which is metal coated and a second devoid of metal. Thus, applicant avers that the instant new claim amendments overcome the rejections of the 4/17/07 Office Action based on the Little reference.

Tsuzuki et al. (U.S. 5,679,176): This reference teaches substantially a classical string and tab photovoltaic call assembly. This reference teaches a collector electrode comprising metal or a metal paste (Colmn. 6, ln. 62 through colmn. 7, ln.7). However, no particular structure or methodology was taught for the collector electrode, other than it is "normally formed in a comb shape". The comments regarding instant independent claims 19, 41 and 44 regarding Little also apply to Tsuzuki et al. Applicant asserts that the instant amendments to the claims overcome the rejections of the 4/17/07 Office Action based on the Tsuzuki et al. reference.

Lupinski (U.S. 3,764,280): Lupinski shows an embodiment of an electrodeposit coating a material structure comprising a polymer. The material originally is formed by heavily loading an elastomeric binder with metal oxide particles. A conductive surface coating is formed on the material in-situ via an electrochemical reduction process of the oxide to metal. The resulting conductive surface may be subsequently electroplated with metal. Lupinski thus teaches a structure comprising a metal deposited over a material comprising a polymer.

However, Lupinski does not teach or suggest using his structure as an electrode or interconnect structure in combination with a conductive or semi-conductive according to the instant independent claims 19, 41, and 44. Indeed, in many respects Lupinski teaches away from making such a combination. Specifically,

- Lupinski employed small plaques of rigid materials (Lexan, polystyrene, ABS, polysulfone) as substrates supporting his metal oxide filled formulations. Where reported, the thickness of the plaque was .125 inch (Colmn. 10, ln. 56). As a practical matter, it would be quite difficult to achieve and maintain effective surface contact of such a rigid substrate surface with a mating conductive or semi-conductive surface.
- Lupinski reported very slow reduction rates during his initial "preplating" reduction step. For example, using his Example 1 and reasonable assumptions, a lateral growth rate of reduction of approximately 0.1 inch per minute can be deduced. (3 inch growth over 30 minutes). Other examples took far longer. However, when producing the combinations of the instant invention, extended thin traces are often required. The processing rates taught by Lupinski would be clearly impractical to produce the combinations of the instant invention.
- In Example 6 of Lupinski, he reports that the technology includes penetration of plating (and therefore the cyanide plating solution) into the coating. This situation would result in active, ionic electroplating solution trapped within the metallic

regions of any proposed electrode. This situation would likely be intolerable in combination with a conductive surface or semi-conductive surface, particularly that of an optoelectric device. Such devices are well known to be very sensitive to deterioration caused by small amounts of material contaminants and corrosive action.

Applicant asserts that the instant amendment overcomes or renders moot the basis for claim rejections of the Patent Office action mailed 04/17/2007, and that the instant claims are in condition for allowance. Allowance is respectfully solicited.

Respectfully submitted,

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7/18/07

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